THURSDAY, MARCH 3, 1887

ENDOWMENT OF MEDICAL RESEARCH

OUR readers will probably have seen that a memorial, signed by some of the most able and trusted leaders in science and in medicine, has been presented to the Council of the Royal College of Surgeons, asking it to consider the propriety of establishing a new institution for the prosecution of such branches of science as are most closely connected with the objects of the College. There is no doubt that the memorial will be carefully and maturely considered in a spirit worthy of the eminent men who guide the policy of the College, but it seems fitting that in these columns the excellence of the suggestion should be acknowledged, whatever may be found to be the best method of meeting it.

In the first place, all who care for English biology and English surgery can heartily rejoice that the College which has done so much for both is now in a position not only of dignity but of affluence. Just before the foundation of the present College, the Company of Surgeons which preceded it was almost bankrupt, and, by want of observing a legal formality, well nigh forfeited its charter. But for fifty years past the College has grown in honour and in wealth. Its Membership stands deservedly first among the surgical diplomas which admit to practice. Its Fellowship involves higher training and more thorough examination than most University degrees. It possesses the second Medical Library in the kingdom, and the most complete, extensive, and well-arranged Museum of Anatomy—human, comparative, and pathological—which exists in the world. The original Hunterian Collection which was purchased by the nation after the death of the great anatomist, was intrusted to the care of the College of Surgeons on condition of providing a suitable building and a competent Curator. The trust has been nobly dealt with. The museum left by Hunter, still cherished with reverence and still remarkable in varied aspects, has been many times multiplied by successive additions. Buildings of great size and admirable design have again and again been added. Curators have been appointed who have made their names familiar through Europe—Clift, Quekett, Owen, and Flower. And Hunterian Professors and Lecturers have been appointed who have made the Museum as well known as that of the Jardin des Plantes—Sir Everard Home and Sir Richard Owen, Huxley, Flower, and Parker, among anatomists; and, among surgeons, Abernethy, Cline, Astley Cooper, Laurence, Hilton, Fergusson, and Paget. Far from reserving its theatre for the veterans only, the College has shown a laudable liberality in founding Junior Lectureships; and now some of the most industrious, thoughtful, and brilliant of the younger generation of anatomists and pathologists are describing their new investigations from the Chair of the Hunterian Museum.

Now, however, there seems to be a probability of the College making another and an enduring addition to the benefits which it has conferred on science.

A large bequest has enabled them seriously to consider the foundation of such an institution as is suggested in the memorial above mentioned. With some the impulse to save is stronger than the impulse to spend; and even if it is determined to spend the Wilson bequest, part at least might be safely applied to further extension and improvement of the Museum, fresh buildings, and an increased staff of officials. Still we hope that it may be found possible to meet such current needs by current income, and that the large sum placed at the free disposal of the College will be devoted to some new, useful, and appropriate scientific purpose.

The appropriate purpose is not far to seek. A museum is necessary for the study of anatomy, the one half of the science of living creatures; but for the prosecution of the other half, for the study of physiology, a laboratory is needful, where the physical, chemical, and vital phenomena of man and animals can be observed. Hunter himself was never content with the mere demonstration of a fact in living structures, normal or diseased. His acute and fertile intellect at once inquired: How came it about? What is its use? Of what process is it the evidence? How can that process be either checked or fostered for the relief of suffering and preservation of life?

The progress of knowledge since Hunter's day has vastly increased our power of dealing with these questions: many have been already more or less perfectly answered; more are ripe for solution to anyone who can give time and pains to the work; and most lie still untouched, a rich and virgin field ready to reward the man of thought as well as skill. But the methods of research have become more and more elaborate. The easy things have been done; or rather what was once hard has now become easy, and what once was impossible is now practicable, with greater expenditure of time and money. The change is only what has taken place in navigation, in war, and in engineering. Few scientific investigations can now be carried on except in properly equipped laboratories.

There are many departments in which work is urgently needed, and in which our own country is discreditably behindhand. In Germany and France and America, even in smaller countries like Holland and Sweden, adequate, or something like adequate, provision is made for the investigations of which we speak. Edinburgh has made great strides of late years, and there the University laboratories of physiology and pharmacology are worthy of the place. Cambridge has, since Prof. Foster was called to the University, been known through Europe for the first time as a great school of physiology. Oxford has lately built and furnished a laboratory for Prof. Sanderson. But London is still far behind the three chief Universities of the kingdom, and behind Paris and Lyons, Strassburg, Berlin, Leipzig, Bonn, and a host of petty towns in Germany.

It is true that before he was carried away to Oxford Dr. Burdon Sanderson had established a laboratory at University College which is a credit to London, and where work of the best kind has been and is being done. At King's College, though the accommodation is not what it should be, Prof. Gerald Yeo and his assistants put forth no less excellent results. In two at least of the great medical schools physiological laboratories have long existed, and have contributed to the progress of knowledge, as well as to instruction. Lastly, the titular University of London has, owing to the exertions of two

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or three of its medical graduates on the Senate, founded an institute for the study of comparative pathology which, under Sanderson, Klein, Greenfield, Roy, and Horsley, has accomplished results of great benefit both to domestic animals and to man.

If, however, physiology and pathology are to some extent provided with means for research, others of the sciences allied to medicine and surgery are absolutely destitute. Physiological chemistry has scarcely existed in England since the days of Prout, and at the present day there is not a single laboratory where this difficult and important branch of knowledge is pursued. When Dr. Gamgee's excellent text-book is completed, the Index Auctorum will scarcely contain an English name.

Pharmacology—the experimental investigation into the action of drugs—is another foreign science. Fraser and Brunton have done much to redeem this country from absolute sterility, but in London there ought to be a laboratory like that of Prof. Schmiedeberg for this most obviously and practically useful of all medical sciences.

A laboratory for the study of Physiology would be the most closely connected with the memory of Hunter, with the Museum, and with the traditions of the College. A laboratory of physiological, pathological, or therapeutical chemistry would perhaps fill the most absolutely vacant space. A laboratory devoted to the direct study of the nature, origin, and propagation of Diseases, to their prevention, and to surgical methods of treatment would be the most directly useful and probably the most immediately fruitful.

So much is needful before England can begin to contribute her fair share to the common sum of knowledge, that it is scarcely possible to go far wrong in deciding what branch of medical science should first be taken up.

The Royal College of Surgeons has a great opportunity, and one that is not likely to return. If the great accession to its resources should be frittered away on a multitude of objects, the opportunity will be missed, and probably for ever. But we cannot doubt that the leading scientific surgeons in the kingdom will decide on using the Wilson bequest for the endowment of some new and urgently needed institution for research, which will be an honour to the College, a credit to the nation, and an instrument for increasing knowledge and diminishing suffering for centuries to come.

THE ELECTRIC MOTOR

The Electric Motor and its Applications. By T. C. Martin and Jos. Wetzler. (New York: Johnson, 1887.)

CONSIDERING the very rapid strides that have been made during the past six years in the industrial application of electric motors, the appearance of this handsome volume, giving the latest information on this topic, is thoroughly timely. It constitutes, though somewhat popular in style, a welcome addition to the library of the electrical engineer. Those who are accustomed only to the slow and steady development of industries in the Old World can hardly appreciate the revolution that is setting in in consequence of the employment, especially in small workshops and factories, of electric motors in place of steam-engines or gas-engines. They win their way because, though the actual cost of power is no cheaper, the expense of the electric motor is less than that of the steam-engine or gas-engine. It is less troublesome to keep in order, takes less room, runs at a more uniform speed, and is more cleanly. What wonder, then, that thousands—literally—of electric motors are already in use in New England, where an invention is welcomed, not sneered at, because it is new.

Much of the volume before us has already seen the light in another form in the pages of our American contemporary, the *Electrical World*, but the matter has been very carefully edited and arranged. It is by no means a scissors-and-paste affair; but a well-considered treatise, abundantly illustrated with drawings of motors and of their various applications. It treats the subject both historically and systematically.

The first chapter is devoted to an exposition of the elementary principles of electric motors. Almost at once we are plunged into the essence of the matter, the development in the armature of the motor of the counter-electromotive force, that *crux* of the untrained electrician. In this connection Jacobi's law, that the electric motor does its greatest possible work when it diminishes the original current to one-half, is given, and correctly given, not as a law of maximum efficiency, for which it has been so often mistaken, but as a law of maximum activity. But the authors have missed the point that Jacobi's law even in this sense is only true when the condition of supply of the electric energy is that of a given constant electromotive force. Jacobi's law would obviously not apply to motors placed in a circuit in which the given condition of supply was that of a constant current. The chapter concludes with some very apposite remarks on the general principles of construction of electric motors, quoted from a paper in the *Philosophical Magazine* by an English electrician, Mr. W. Mordey.

Chapter II. is devoted to early motors and experiments in Europe, from Barlow's wheel and the primitive engines of Jacobi and Froment down to the famous Pacinotti machine. The complement to this narrative is found in Chapter III., which deals with the early motors and experiments in America, beginning with Davenport in 1837. The most celebrated of these was that of Prof. C. G. Page, who succeeded in constructing a motor of 10 horse-power. The authors incidentally mention that, in the period of the Civil War, between 1860 and 1867 not a single patent on electric motors was issued in America.

Chapter IV. deals with the electric transmission of power, as developed successively by Pacinotti, Fontaine, and Marcel Deprez. In this connection the theory of the efficiency of electric transmission is explained by the use of graphic diagrams in which the areas are proportional to the energy transmitted or to the work performed. The experiments of Marcel Deprez are mildly criticised, and rules for calculating the cost are given.

The modern electric railway and tramway in Europe occupy Chapter V. Here several of Siemens's tramways are described, also those at the Giant's Causeway, at Brighton, and at Blackpool. Chapter VI. gives a similar account of the modern electric railway and street-car line in America. From this account it appears that Mr. Stephen D. Field is in America awarded the sole right to use "the combination of an electric motor operated by means of a current from a stationary source of electricity conducted through the rails," which "combination" he patented in 1880. Drawings of the electric

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